

# AN OVERVIEW OF THE ZIKA VIRUS EPIDEMIC AND WHAT AMERICA CAN DO TO PREVENT THE SPREAD OF THE VIRUS IN THE FUTURE

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## I. INTRODUCTION

Since the first discovery of the Zika Virus in 1951, the virus has spread throughout the world, infecting almost every country in the Americas, portions of South East Asia, and Cape Verde in Africa.<sup>1</sup> The most common symptoms of the virus include fever, rash, joint pain, and red eye, with other symptoms including muscle pain and headache.<sup>2</sup> While symptoms of the virus are mild in adults, the Zika Virus can have negative effects on fetuses.<sup>3</sup>

In the United States, the federal government has spent \$1.1 billion to aid in the fight against the Zika Virus, which was passed in a stopgap spending bill to keep the American government running.<sup>4</sup> The state of Florida, as the first state to see local transmission of the virus, has spent \$62.1 million in state funds for the Zika Virus.<sup>5</sup> The World Health Organization has spent \$23.9 million to help those who are suffering

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<sup>1</sup> *All Countries & Territories with Active Zika Virus Transmission*, Centers for Disease Control and Prevention, <https://www.cdc.gov/zika/geo/active-countries.html> (last updated Feb. 1, 2017).

<sup>2</sup> *Overview*, Centers for Disease Control and Prevention, <https://www.cdc.gov/zika/about/overview.html> (last updated Feb. 13, 2017).

<sup>3</sup> Jennifer J. Brown, *10 Essential Facts About the Zika Virus*, EVERYDAY HEALTH (Oct. 27, 2016), <http://www.everydayhealth.com/news/10-essential-facts->

NEWS (Sept. 29, 2016) <http://www.nbcnews.com/storyline/zika-virus-outbreak/congress-finally-passes-zika-funding-bill-n658666>.

<sup>5</sup> *Gov. Scott Authorizes \$25 Million in State Funds for Zika Virus Vaccine Research and Development*, Rich Scott 45<sup>th</sup> Governor of Florida (Sept. 22, 2016), <http://www.flgov.com/2016/09/22/gov-scott-authorizes-25-million-in-state-funds-for-zika-virus-vaccine-research-and-development/>.

from the medical complications caused by the virus, while also raising awareness in countries of the side effects of the Zika Virus so as to better prepare people to deal with the virus.<sup>6</sup> With the help of the Priority Review Voucher Program, major work towards the creation of a vaccine for the Zika Virus has occurred.<sup>7</sup> Clinical trials for a vaccine started back in August of 2016 at the National Institutes of Health, who is also negotiating with companies to produce vaccines.<sup>8</sup> At the current rate that the Zika Virus is spreading, Marc Santora stated in his article *New York City Wages War on the Zika Virus* “the virus will infect more than ninety million people around the world during the first wave of its epidemic.”<sup>9</sup> This number includes almost two million women who are of childbearing age, which could result in thousands of babies being born with life altering birth defects.<sup>10</sup>

This Comment gives an overview of the Zika Virus and the impacts it has had on the United States and abroad. Part II will examine how the Zika Virus began and made its way throughout the globe. Part III will explore the threats the Zika Virus has caused in relation to pregnancy, Guillain-Barre Syndrome, tourism, human health and wildlife health. Part IV will discuss how funding has been made available to help combat the Zika Virus, through federal programs, federal funding, state funding, and the World Health Organization. Finally, Part V will conclude with a recommendation for future funding through state and federal programs with a focus on non-partisan solutions, while continuing to research and create a vaccine to permanently eradicate the Zika Virus.

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<sup>6</sup> *Zika: Response Funding*, World Health Organization, <http://www.who.int/emergencies/zika-virus/response/contribution/en/> (last updated Jan. 31, 2017).

<sup>7</sup> Nicole Zub, *FDA Priority Review Vouchers: Golden Tickets or Inefficient Incentives?*, LAW STREET (Oct. 11, 2016), <http://lawstreetmedia.com/issues/health-science/fda-priority-review-vouchers/>.

<sup>8</sup> Bill Berkrot, *Zika Vaccine Race Spurred by Crisis, Profit*, JAPAN NEWS (Oct. 12, 2016), <http://the-japan-news.com/news/article/0003270098>.

<sup>9</sup> Marc Santora, *New York City Wages War on the Zika Virus*, N.Y. TIMES (Aug. 21, 2016), <http://www.nytimes.com/2016/08/22/nyregion/new-york-city-zika-virus.html>.

<sup>10</sup> *Id.*

## II. BACKGROUND

The Zika Virus was first discovered in Uganda in 1947 and was identified in monkeys.<sup>11</sup> The virus was later identified in humans in 1952.<sup>12</sup> The first large human outbreak of the disease was reported from the Island of Yap in 2007.<sup>13</sup> On February 26, 2016 the United States reported two sexually transmitted cases of the Zika Virus.<sup>14</sup>

In America, the fight against the Zika Virus began when it was added by legislation to the FDA Priority Review Voucher program in 2016.<sup>15</sup> Major threats to tourism throughout the United States and in the Caribbean encouraged a plan to be put in place quickly.<sup>16</sup> In Congress, H.R. 4446 was introduced in the House of Representatives in February 2016, but the bill was not passed.<sup>17</sup> The bill's intent was to take funds that were made available for Ebola response and preparedness and to apply those funds to Zika Virus response and preparedness instead.<sup>18</sup> After months of deliberation, Congress later passed a different Zika Virus funding bill for \$1.1 billion on September 29, 2016, in connection with a bill that was passed to keep the government functioning.<sup>19</sup>

As the 2017 mosquito season is about to begin, and on April 5, 2017 there have been 5,197 travel-associated cases of the Zika Virus reported in the United States, with 1,116 of those cases being found in Florida.<sup>20</sup> Florida has also reported 216 locally transmitted cases of the

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<sup>11</sup> *The History of Zika Virus*, World Health Organization, <http://www.who.int/emergencies/zika-virus/timeline/en> (Dec. 22, 2016).

<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

<sup>14</sup> *Id.*

<sup>15</sup> *Priority Review Voucher*, <http://priorityreviewvoucher.org> (last visited Oct. 12, 2016).

<sup>16</sup> Ken Storey, *Zika has Already Caused a Noticeable Impact on Tourism*, ORLANDO WEEKLY (May 31, 2016), <http://www.orlandoweekly.com/Blogs/archives/2016/05/31/zika-has-already-caused-a-noticeable-impact-on-tourism>.

<sup>17</sup> Zika Response and Safety Act of 2016, H.R. 4446, 114th Cong. (2016).

<sup>18</sup> *Id.*

<sup>19</sup> Fox, *supra* note 4.

<sup>20</sup> *Case Counts in the US*, Centers for Disease Control and Prevention (Dec. 28, 2016) <http://www.cdc.gov/zika/geo/united-states.html>.

Zika Virus, and Texas has reported six locally transmitted cases.<sup>21</sup> Since arriving in the states, more than 800 pregnant women have been infected with the Zika Virus.<sup>22</sup> The Florida Department of Health had also recently announced that the transmission area of Miami Beach was cleared, meaning that there are no longer areas in Florida that are identified as active transmission zones, but reminds residents that active transmission can still occur.<sup>23</sup> The Zika Virus has been reported in at least fifty-nine countries and territories since it first appeared in the Americas.<sup>24</sup>

A problem that has arisen with tracking the spread of the Zika Virus is that many people infected with the virus will have no symptoms, or will have very mild symptoms.<sup>25</sup> Whether someone has the infection can be confirmed only with a blood or urine test.<sup>26</sup> Other concerns with the virus is that pregnant women who contract the Zika Virus during their pregnancy can have children born with microcephaly and other fetal brain defects.<sup>27</sup> Currently, no vaccine or medicine exists to cure the Zika Virus.<sup>28</sup>

### III. THREATS

#### *A. Pregnancy*

The Zika Virus can cause different fetal developmental defects such as calcification of the brain, excess fluid around the brain,

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<sup>21</sup> *Id.*

<sup>22</sup> Fox, *supra* note 4.

<sup>23</sup> *Id.*

<sup>24</sup> Lisa Rapaport, *The Zika Virus Can Cause More Birth Defects Beyond Microcephaly*, HUFFINGTON POST (Oct. 4, 2016), [http://www.huffingtonpost.com/entry/the-zika-virus-can-cause-more-birth-defects-beyond-microcephaly\\_us\\_57f3c66de4b0703f75910e7e](http://www.huffingtonpost.com/entry/the-zika-virus-can-cause-more-birth-defects-beyond-microcephaly_us_57f3c66de4b0703f75910e7e).

<sup>25</sup> *Symptoms, Testing, & Treatment*, CENTERS FOR DISEASE CONTROL AND PREVENTION (Jun. 21, 2016), <http://www.cdc.gov/zika/symptoms/index.html>.

<sup>26</sup> *Id.*

<sup>27</sup> *Pregnancy*, CENTERS FOR DISEASE CONTROL AND PREVENTION (Aug. 22, 2016), <https://www.cdc.gov/zika/pregnancy/>.

<sup>28</sup> *Symptoms, Testing, & Treatment*, *supra* note 26.

underdeveloped brain structure, eye abnormalities, hearing loss, and damage to nerves, bones, and muscles.<sup>29</sup>

The most well-known fetal defect is microcephaly: a rare neurological condition where an infant's head is significantly smaller than the heads of other children of the same age and sex.<sup>30</sup> Babies that are born with microcephaly are born with incomplete brain development, and have a variety of problems including developmental delay, intellectual disability, problems with balance and movement, hearing loss, and vision problems.<sup>31</sup> As of February 21, 2017, there have been fifty-six babies with Zika Virus-related birth defects born in the United States, and seven pregnancy losses with Zika Virus-related defects.<sup>32</sup>

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<sup>29</sup> Live chat interview with anonymous specialist, MotherToBaby, (Oct. 12, 2016).

<sup>30</sup> *Diseases and Conditions Microcephaly*, Mayo Clinic, <http://www.mayoclinic.org/diseases-conditions/microcephaly/basics/definition/con-20034823> (last visited Jan. 25, 2017). The Center for Disease Control and Prevention defines microcephaly as an infant with a head circumference less than two standard deviations below the mean for a child the same age and sex as the infant at birth. *Possible Association Between Zika Virus Infection and Microcephaly-Brazil*, 2015, Centers for Disease Control and Prevention (Jan. 29, 2016), <http://www.cdc.gov/mmwr/volumes/65/wr/mm6503e2.htm>.

<sup>31</sup> Florida Department of Health Office of Communications, *Zika-Related Microcephaly Case Confirmed in Florida*, FLORIDA HEALTH (June 28, 2016), <http://www.floridahealth.gov/newsroom/2016/06/062816-zika-update.html>.

<sup>32</sup> *Outcomes of Pregnancies with Laboratory Evidence of Possible Zika Virus Infections in the United States*, Centers for Disease Control and Prevention, <http://www.cdc.gov/zika/geo/pregnancy-outcomes.html> (last visited Feb. 7, 2017). The first case of microcephaly in the United States occurred in West Palm Beach, Florida from a travel-related case of the Zika Virus in June of 2016. *DOH Confirms First Zika-Related Case of Microcephaly in Florida; governor Scott Calls on CDC to Host Call with Medical Professionals*, Rick Scott 45<sup>th</sup> Governor of Florida, (Jun. 28, 2016), <http://www.flgov.com/2016/06/28/doh-confirms-first-zika-related-case-of-microcephaly-in-florida-governor-scott-calls-on-cdc-to-host-call-with-medical-professionals/>. After the birth of the child, Florida Governor Rick Scott stated, "now that a baby has been born in our state with adverse impacts from the Zika Virus, it is clear that every available resource is needed to prevent local transmissions in our state. *Id.* The mother of the child was a citizen of Haiti, and came to Florida for the purpose of delivering her baby. *Zika-Related Microcephaly Case Confirmed in Florida*, *supra* note 32. The Florida Department of Health is working with the family to connect the child with services offered by the Early Steps Program, which serves families of infants

New research out of Rio de Janeiro, Brazil, suggests that nearly half of pregnant women who are infected with the Zika Virus during pregnancy experience serious complications such as miscarriages or significant birth defects.<sup>33</sup> While the study was small, it is the first study of its kind to look at pregnancy outcomes of women who were infected with the virus.<sup>34</sup> Preliminary data from another study has stated that around one in ten babies infected with the Zika Virus in the first trimester will develop serious brain damage.<sup>35</sup> Other researchers have discovered that babies affected by the Zika Virus, while normal at birth, can still have brain damage that is discovered later.<sup>36</sup> While researchers hypothesized that this might happen, there have been no cases of later in life defects arising, and parents that are worried are still awaiting answers.<sup>37</sup> The Center for Disease Control and Prevention estimates that the lifetime medical costs for a child born with microcephaly could amount to more than \$10 million.<sup>38</sup>

### B. Guillain-Barre Syndrome

Guillain-Barre Syndrome is an uncommon illness where a person's immune system damages nerve cells, which causes muscle weakness and in some cases will cause paralysis.<sup>39</sup> The syndrome is rare, with around 20,000 cases diagnosed in the United States each year.<sup>40</sup> As of

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and toddlers who have developmental delays. *Early Steps*, Florida Health, <http://www.floridahealth.gov/programs-and-services/childrens-health/early-steps/index.html> (last visited Jan. 25, 2017).

<sup>33</sup> Gretchen Vogel, *First Hard Look at Zika Pregnancies Finds Nearly Half Result in Miscarriage or Birth Defects*, SCIENCE (Dec. 13, 2016), <http://www.sciencemag.org/news/2016/12/first-hard-look-zika-pregnancies-finds-nearly-half-result-miscarriage-or-birth-defects>.

<sup>34</sup> *Id.*

<sup>35</sup> Tom Frieden and Edward McCabe, *One Year Later, Zika Still Affects Us All*, WASHINGTON POST (Jan. 12, 2017), [https://www.washingtonpost.com/opinions/one-year-later-zika-still-affects-us-all/2017/01/12/98d272f6-d8dd-11e6-9f9f-5cdb4b7f8dd7\\_story.html?utm\\_term=.d3d2fc1daacd](https://www.washingtonpost.com/opinions/one-year-later-zika-still-affects-us-all/2017/01/12/98d272f6-d8dd-11e6-9f9f-5cdb4b7f8dd7_story.html?utm_term=.d3d2fc1daacd).

<sup>36</sup> Vogel, *supra* note 34.

<sup>37</sup> Frieden, *supra* note 36.

<sup>38</sup> *Id.*

<sup>39</sup> *Zika and Guillain-Barre Syndrome*, Centers for Disease Control and Prevention, <http://www.cdc.gov/zika/healtheffects/gbs-qa.html>.

<sup>40</sup> *Guillain-Barre Syndrome*, Google, (last visited Dec. 24, 2016), [https://www.gstatic.com/healthricherkp/pdf/guillain\\_barre\\_syndrome.pdf](https://www.gstatic.com/healthricherkp/pdf/guillain_barre_syndrome.pdf).

February 1, 2017, there have been thirteen cases of Guillain-Barre Syndrome in the United States and fifty-two cases in the U.S. Territories.<sup>41</sup> Since this date, the counts of Guillain-Barre Syndrome have been removed from the Centers for Disease Control and Prevention's website.

Researchers have found a link between the Zika Virus and Guillain-Barre because of a close association between simultaneous increases in Zika Virus cases and increases in Guillain-Barre.<sup>42</sup> There have been significant increases in Guillain-Barre since the Zika Virus has started to spread, with some countries having doubled the percentage of those suffering.<sup>43</sup> In Colombia there has been a 221 percent increase, Dominican Republic a 150 percent increase, El Salvador a 100 percent increase, Honduras a 144 percent increase, Suriname a 400 percent increase, and in Venezuela, an 877 percent increase.<sup>44</sup>

While there is currently no cure for Guillain-Barre, plasma exchange and immunoglobulin therapy treatments can help to speed up the recovery time and reduce the severity of the illness.<sup>45</sup>

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<sup>41</sup> *Case Counts in the US*, *supra* note 20. Generally, Guillain-Barre will have conditions that progressively get worse for patients for about two weeks, with those symptoms reaching a plateau within four weeks, and after the first month, recovery begins and lasts between six to twelve months. *Diseases and Conditions Guillain-Barre Syndrome*, Mayo Clinic, <http://www.mayoclinic.org/diseases-conditions/guillain-barre-syndrome/basics/treatment/con-20025832>. Patients that suffer from Guillain-Barre Syndrome often require intensive care and a respirator to support their breathing. Julie Steenhuysen, *Study Finds Strong Link Between Zika and Guillain-Barre Syndrome*, HUFFINGTON POST (Sept. 1, 2016), [http://www.huffingtonpost.com/entry/study-find-strong-link-between-zika-and-guillain-barre-syndrome\\_us\\_57c8ad8be4b078581f125668](http://www.huffingtonpost.com/entry/study-find-strong-link-between-zika-and-guillain-barre-syndrome_us_57c8ad8be4b078581f125668).

<sup>42</sup> Steenhuysen, *supra* note 42.

<sup>43</sup> Maggie Fox, *As Zika Spread, Paralyzing Guillain-Barre Syndrome Skyrocketed*, NBC NEWS (Sept. 1, 2016), <http://www.nbcnews.com/storyline/zika-virus-outbreak/study-finds-strong-link-between-zika-paralyzing-guillain-barr-syndrome-n641276>.

<sup>44</sup> *Id.*

<sup>45</sup> *Diseases and Conditions Guillain-Barre Syndrome*, *supra* note 42.

### C. Tourism

The tourism industry has been largely affected by the Zika Virus, and the effects can be clearly seen in Florida, Puerto Rico, and the rest of the Caribbean countries.

#### i. Florida

Florida, which is heavily dependent on tourism, could face severe issues if the Zika Virus continues to spread. Around 106 million people visited Florida last year, making 2015 the fifth year in a row where the state broke its previous year's record numbers for visitations.<sup>46</sup> The tourism and travel industry in Florida employs 1.2 million state residents, and brought in \$89 billion in profit last year.<sup>47</sup>

While things may change in the future, currently no data has been released that indicates that the Zika Virus has had any effects on tourism.<sup>48</sup> Even though numbers do not show a decrease in tourism, many people have canceled trips to Florida to avoid the risk of contracting the Zika Virus.<sup>49</sup> Businesses in the Wynwood area of Miami have been able to see monetary results of tourists cancelling trips by seeing a decrease in the number of patrons, because of the areas risk for active transmission.<sup>50</sup>

Where tourists are traveling from is also a cause for concern for the spread of the Zika Virus in the Sunshine State. Around 1.48 million tourists that have recently visited Florida hail from Brazil, a country where the virus has spread rapidly.<sup>51</sup> Brazil ranks third as the country

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<sup>46</sup> Aaron Smith, *Could Zika Pose a Problem for Florida's Tourism Industry?*, CNN MONEY (July 29, 2016), <http://money.cnn.com/2016/07/29/news/zika-florida-tourism/>.

<sup>47</sup> Drew Harwell, *Spread of Zika, and Cloud of Fear, Threatens Florida's Tourism Way of Life*, WASHINGTON POST (Aug. 1, 2016), <https://www.washingtonpost.com/news/business/wp/2016/08/01/spread-of-zika-and-cloud-of-fear-threatens-floridas-tourism-way-of-life/>.

<sup>48</sup> *Id.*

<sup>49</sup> *Id.*

<sup>50</sup> Karen Schwartz, *Florida's \$82 Billion Tourism Industry Braces for Zika*, N.Y. TIMES (Aug. 3, 2016), [http://www.nytimes.com/2016/08/04/us/zika-florida-miami-tourism.html?\\_r=0](http://www.nytimes.com/2016/08/04/us/zika-florida-miami-tourism.html?_r=0).

<sup>51</sup> Lloyd Dunkelberger, *Florida's Tourism Surge Vulnerable to Threat of Zika Outbreak*, DAYTONA BEACH NEWS-JOURNAL (May 21, 2016),



that sends the most tourists to Florida, behind Canada and Great Britain.<sup>52</sup> Visitors from the Caribbean nations have also come over in large masses, with 706,000 visiting last year.<sup>53</sup> This statistic includes visitors from Puerto Rico, which raises concerns because one million people in central Florida have ties to Puerto Rico. This could cause more issues with the spread of the Zika Virus.<sup>54</sup>

The Florida Department of Health reports that there are 277 non-travel related cases of the Zika Virus as of March 2, 2017.<sup>55</sup> While originally the local transmission occurred within a four and a half square mile area of Miami Beach, the Department of Health has announced that there are no longer areas that are identified as having active Zika Virus transmission.<sup>56</sup> The Florida Department of Health continued by saying that while there are no longer any active transmission zones in Florida that does not mean that there is not ongoing active transmission taking place.<sup>57</sup>

London School of Hygiene and Tropical Medicine Professor Jimmy Witworth has warned the British people to “think twice” about traveling to parts of the United States that are dealing with the Zika Virus.<sup>58</sup> His warning specifically told Brits to avoid the states of Texas, Louisiana, and Florida.<sup>59</sup> This is concerning for local tourism because visitors from the United Kingdom constitute a large percentage of visitors to Florida, with 1.72 million visiting in 2015.<sup>60</sup>

Despite the concern of how the Zika Virus will affect Florida’s tourism numbers, Governor Rick Scott has remained confident in

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<http://www.newsjournalonline.com/news/20160521/floridas-tourism-surge-vulnerable-to-threat-of-zika-outbreak>.

<sup>52</sup> *Id.*

<sup>53</sup> *Id.*

<sup>54</sup> *Id.*

<sup>55</sup> *Current Travel Safety Information*, *supra* note 23.

<sup>56</sup> *Id.*

<sup>57</sup> *Id.*

<sup>58</sup> Charlie Haynes & Stephen Adams, *Zika Expert warns Britons to ‘Think Twice’ About Trips to Disney World because the Virus is Set to Reach the US*, DAILY MAIL (May 28, 2016), <http://www.dailymail.co.uk/news/article-3614551/Zika-expert-warns-Britons-think-twice-trips-Disney-World-virus-set-reach-US.html>.

<sup>59</sup> *Id.*

<sup>60</sup> *Florida Tourism Numbers 2015*, FLORIDA REVIEW & TRAVEL GUIDE, <http://www.floridareview.co.uk/useful-resources/florida-tourism-numbers>.

Florida's ability to manage the virus. Governor Scott stated that "Florida has a proven track record of success when it comes to managing similar mosquito-borne viruses. We will continue to keep our residents and visitors safe, utilizing constant surveillance and aggressive strategies, such as increases in mosquito spraying, that have allowed our state to fight similar viruses."<sup>61</sup> In order to prepare for the 2017 mosquito season, the states mosquito control districts have asked for \$3.8 million from the state to pay for research and mosquito prevention in counties that have a smaller mosquito control budget.<sup>62</sup> Governor Scott has asked the legislature to include \$2.6 million in the 2017-18 budget to help in the fight against the Zika Virus, which is the same amount that the state spent in 2016.<sup>63</sup>

## ii. Puerto Rico and the Caribbean

Puerto Rico has not been as fortunate as Florida when it comes to protecting tourism losses. When the Zika Virus became a major threat to tourism, the Puerto Rican government put in a prevention campaign, with an emphasis on education and control of the disease, but it has not been successful.<sup>64</sup> There has been significant economic loss in Puerto Rico, totaling a \$28 million loss in tourism since the Zika Virus began to take hold.<sup>65</sup> Around 41,000 nightly room reservations have been canceled over the next two years because of concerns of the virus, which has been used to project the total loss the Commonwealth may face due

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<sup>61</sup> Gov. Scott: Florida Calls on CDC to Activate Emergency Response Team Following Confirmed Mosquito-Borne Transmissions, Rick Scott 45th Governor of Florida, Aug. 1, 2016, <http://www.flgov.com/2016/08/01/gov-scott-florida-calls-on-cdc-to-activate-emergency-response-team-following-confirmed-mosquito-borne-transmissions/>.

<sup>62</sup> Michael Auslen, *Summer is Coming. So is Zika*, MIAMI HERALD (March 15, 2017), <http://www.miamiherald.com/news/local/community/miami-dade/article138674618.html>.

<sup>63</sup> *Id.*

<sup>64</sup> Sarah Feldberg, *Puerto Rico Tourism Drops as Zika Infections Accelerate*, TRAVEL WEEKLY (Aug. 9, 2016), <http://www.travelweekly.com/Caribbean-Travel/Puerto-Rico-tourism-drops-as-Zika-infections-accelerate>.

<sup>65</sup> Schwartz, *supra* note 51.

to the Zika Virus.<sup>66</sup> CheapCaribbean.com alone has seen 850 cancellations due to the Zika Virus.<sup>67</sup>

The Center for Disease Control and Prevention has held seminars to help hotels eliminate mosquito breeding areas on their properties, and the Puerto Rico Tourism Company gave recommendations on informing guests on how they can prevent the spread of the Zika Virus.<sup>68</sup>

Many annual conferences in the Bahamas and Puerto Rico were canceled due to the breakout of the Zika Virus, which has a significant effect on the tourism industry.<sup>69</sup> There has also been a reduction in the number of conferences being announced in places affected by the Zika Virus for the 2017 season.<sup>70</sup>

The hotel industry in the Caribbean has seen on average, a three percent drop in occupancy due to the Zika Virus, and many hotels expect to see tourism numbers decline more over the next few months and even years.<sup>71</sup>

#### *D. Health and Wildlife Concerns*

##### *i. Health*

Finding a way to spray for the Zika Virus has required the aerial spraying of the chemical naled.<sup>72</sup> This chemical is approved for use against adult mosquitoes, but can be toxic to honeybees, birds, fish, and people.<sup>73</sup> The chemical is designed to kill mosquitoes on contact, can stay airborne for a long period of time, and will begin to break down once exposed to sunlight or water.<sup>74</sup> Studies suggest that long-term

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<sup>66</sup> *Id.*

<sup>67</sup> Feldberg, *supra* note 65.

<sup>68</sup> *Id.*

<sup>69</sup> Schwartz, *supra* note 51.

<sup>70</sup> *Id.*

<sup>71</sup> Storey, *supra* note 16.

<sup>72</sup> Andres Viglucci, *Is Insecticide Sprayed to Fight Zika a Risk for People and Wildlife?*, MIAMI HERALD (Aug. 12, 2016), <http://www.miamiherald.com/news/health-care/article95158007.html>.

<sup>73</sup> *Id.*

<sup>74</sup> Ray Sanchez, Debra Goldschmidt and Susan Scutti, *Zika Spraying in Miami: What You Need to Know*, CNN (Sept. 9, 2016), <http://www.cnn.com/2016/09/08/health/florida-zika-spraying-concerns/index.html>.

exposure to naled, even at low levels, can cause neurological and developmental issues in human fetuses.<sup>75</sup>

While the Environmental Protection Agency and the Centers for Disease Control has stated that naled does not pose a health risk to people or pets, the European Union has a contrary position and stated that naled should be banned from use.<sup>76</sup> The Centers for Disease Control has also stated that aerial spraying of naled will not pollute water or contaminate soil.<sup>77</sup>

Aerial spraying of naled began in the Wynwood neighborhood in Miami-Dade County, Florida and was sprayed a total of four times.<sup>78</sup> Naled was also sprayed four times in the Miami Beach area.<sup>79</sup> Protests have occurred in Miami Beach over the use of the chemical due to the associated health risks.<sup>80</sup> Protests have also broken out in Puerto Rico over the use of naled and medical groups have denounced its use.<sup>81</sup>

## ii. Wildlife

The chemical naled has created negative wildlife impacts, and studies have shown that has naled contributed to the decline of butterfly populations in South Florida.<sup>82</sup> This prompted Miami-Dade County and Monroe County to increase the boundaries for spraying around endangered land where butterflies are known to exist, to give the habitat more reprieve.<sup>83</sup> Beekeepers in South Carolina also suffered from the

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<sup>75</sup> Viglucci, *supra* note 73.

<sup>76</sup> Sanchez, *supra* note 75.

<sup>77</sup> *Information on Aerial Spraying*, Centers for Disease Control and Prevention, <http://www.cdc.gov/zika/vector/aerial-spraying.html> (Dec. 13, 2016).

<sup>78</sup> *Wynwood Aerial Spraying*, <http://www.miamidade.gov/solidwaste/wynwood-spraying.asp> (last updated Nov. 3, 2016).

<sup>79</sup> *Aerial Spraying*, <http://www.miamidade.gov/solidwaste/aerial-spraying.asp> (last updated Dec. 16, 2016).

<sup>80</sup> Maggie Fox, *Miami Beach Protesters Shout Down Zika Meeting Over Pesticide Use*, NBC NEWS (Sept. 14, 2016), <http://www.nbcnews.com/storyline/zika-virus-outbreak/miami-beach-protesters-shout-down-zika-meeting-over-pesticide-use-n648256>.

<sup>81</sup> Viglucci, *supra* note 73.

<sup>82</sup> *Id.*

<sup>83</sup> Jenny Staletovich, *Mosquito Spraying in South Florida Scaled Back to Protect Rare Butterflies*, MIAMI HERALD (July 15, 2015), <http://www.miamiherald.com/news/local/environment/article27299731.html>.

use of naled, when the beekeepers lost all of their bees due to the spraying of the chemical.<sup>84</sup>

Despite these negative effects the Centers for Disease Control has stated that when naled is used correctly, there will be minimal risk to bees, birds, and other animals.<sup>85</sup>

As the Zika Virus has continued to spread, countries are taking unique, natural, approaches to curbing the spread of infection.<sup>86</sup> The use of guppies to curb mosquito growth is becoming popular again in Brazil, where city workers and citizens have been dumping guppies into stagnant water in the hopes that the fish will eat the mosquito larvae.<sup>87</sup> A problem that arises from using these fish is that the guppies are an invasive species that quickly adapts to new habitats, and can disrupt the natural flow of the ecosystem.<sup>88</sup> Furthermore, studies have shown that the guppies do not end up eating the mosquitos as their primary source of food, if other options are available, making this approach to mosquito control less effective.<sup>89</sup>

#### IV. FUNDING

##### *A. Food and Drug Administration Priority Review Voucher Program*

The Food and Drug Administration first introduced the Priority Review Voucher Program publication in March of 2006.<sup>90</sup> The authors of the paper advocated for a priority review system that would provide incentives for companies to produce drugs for neglected tropical diseases, a concept that did not exist at the time.<sup>91</sup> The diseases in the Priority Review voucher Program were most likely not going to have

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<sup>84</sup> Sanchez, *supra* note 75.

<sup>85</sup> *Information on Aerial Spraying*, *supra* note 78.

<sup>86</sup> Matt Soniak, *Scientists Warn Cities About Using Fish to Fight Zika*, NEXT CITY (Jan. 23, 2017), <https://nextcity.org/daily/entry/scientists-warn-cities-using-fish-to-fight-zika>.

<sup>87</sup> *Id.*

<sup>88</sup> *Id.*

<sup>89</sup> *Id.*

<sup>90</sup> Zub, *supra* note 7.

<sup>91</sup> *Id.*

treatments that resulted in high profits for the drug companies, because the diseases mostly would affect poor people.<sup>92</sup>

In 2007, Congress passed the Food and Drug Administration Amendments Act, which made the Priority Review Voucher Program a reality.<sup>93</sup> The diseases included in the Priority Review Voucher Program lacked the adequate market incentives to develop drugs by themselves, so the voucher program gave the incentive that they otherwise lacked.<sup>94</sup> The Zika Virus was added to the Priority Voucher List on April 19, 2016.<sup>95</sup> The intent of the Priority Review Voucher Program is to reduce two types of inefficiency: First, the program speeds up the approval of potential blockbuster therapies in the United States, which gets patients access to treatments more quickly; second, the program motivates developers to create more treatments for neglected diseases.<sup>96</sup>

The Food and Drug Administration Amendments Act gives a drug developer a voucher for priority review from the Food and Drug Administration if the treatment for a neglected or rare pediatric disease is created.<sup>97</sup> This voucher can then be used with a product of the developers' choice or sold to another developer.<sup>98</sup> Having priority review means that the Food and Drug Administration aims to render a decision on the drug in six months, though the average time for a decision in recent years has been seven months.<sup>99</sup>

A potential problem with the Priority Review Voucher Program is that a company can receive a voucher even if there is no development for a drug.<sup>100</sup> A company can also seek a voucher for a drug that has already been created and marketed outside of the United States, though generally companies are caught if they attempt to defraud the program in this way.<sup>101</sup>

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<sup>92</sup> Steven Ross Johnson, *Senate Panel Votes to add Zika to Controversial FDA Review Voucher Program*, MODERN HEALTHCARE (Mar. 9, 2016), <http://www.modernhealthcare.com/article/20160309/NEWS/160309842>.

<sup>93</sup> Zub, *supra* note 7.

<sup>94</sup> *Id.*

<sup>95</sup> *Id.*

<sup>96</sup> *Priority Review Voucher*, *supra* note 15.

<sup>97</sup> *Id.*

<sup>98</sup> *Id.*

<sup>99</sup> *Id.*

<sup>100</sup> Johnson, *supra* note 93.

<sup>101</sup> *Id.*

The price of the voucher depends mostly on supply and demand, with demand deriving from three factors: shifting sales earlier; longer effective patient life due to earlier entry; and competitive benefits from earlier entry relative to competitors.<sup>102</sup> A benefit of priority review vouchers is the fact that they never expire, which means developers will take the necessary time to create an effective treatment, rather than just focusing on receiving the money.<sup>103</sup>

The Priority Review Voucher Program is beneficial because the majority of funding for research and development of drugs is based on the final market potential of the drug.<sup>104</sup> This means that most of the drug research that is conducted is focused on drugs that are desired by wealthy people that live in developed countries.<sup>105</sup> The Priority Review Voucher Program does have its issues due to the fact that the program does nothing to ensure that patients and healthcare providers will have affordable access to any treatment that is developed.<sup>106</sup>

### *B. Vaccines*

The potential for the Zika Virus vaccine to become a blockbuster vaccine has attracted the interest of big name drug makers such as Sanofi SA, GlaxoSmithKline PLC, and Takada Pharmaceuticals.<sup>107</sup> This, combined with the National Institutes of Health's announcement that clinical trials for the Zika Virus vaccine were set to begin on August 3, 2016, is a sign that a successful vaccine for the Zika Virus may be created soon.<sup>108</sup>

The National Institute of Health's trial has at least eighty volunteers, with ages ranging from eighteen to thirty-five, and will take

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<sup>102</sup> *Priority Review Voucher*, *supra* note 15.

<sup>103</sup> *Id.*

<sup>104</sup> Economics of World Health: Research and Development of Pharmaceuticals and Ebola, 41 N.C.J. INT'L L. & COM. REG. 137.

<sup>105</sup> *Id.*

<sup>106</sup> *Id.*

<sup>107</sup> Berkrot, *supra* note 8.

<sup>108</sup> *NIH Begins Testing Investigational Zika Vaccine in Humans*, NATIONAL INSTITUTES OF HEALTH (Aug. 3, 2016), <https://www.nih.gov/news-events/news-releases/nih-begins-testing-investigational-zika-vaccine-humans>.

place at three study sites across the United States.<sup>109</sup> The first injection of the potential vaccine occurred in early August in Bethesda, Maryland, and there will be follow-up exams conducted at both eighteen and twenty-four months after receiving the vaccine.<sup>110</sup> The trial is currently in its first phase, with collectable data expected by January 2017, though no data has been released yet.<sup>111</sup> The vaccine being tested includes a small, circular piece of DNA that contains genes that code for proteins of the Zika Virus.<sup>112</sup> The hope is that this vaccine will allow the body to mount an immune response to the Zika Virus proteins, therefore stopping the spread of the virus.<sup>113</sup> Before moving onto human trials the vaccine showed encouraging results in mice and monkeys.<sup>114</sup> The United States government hopes to have safety results from the human trials by the end of 2016, so that Phase Two can begin in early 2017 in areas that have been heavily affected by the virus such as Puerto Rico and Central America, but at this time no results have been published.<sup>115</sup> The National Institute of Health is negotiating with companies to produce vaccines, but also maintains its own manufacturing plant that can make enough of the vaccine for early clinical testing.<sup>116</sup>

Other large pharmaceutical firms are also testing out vaccines to combat the Zika Virus. To start, Inovio Pharmaceuticals and GeneOne LifeScience are currently testing the safety of a synthetic DNA vaccine in Puerto Rico.<sup>117</sup> Sanofi, a French company, has received \$43 million in initial funding from the United States government to develop a vaccine.<sup>118</sup> The Japanese company, Takeda, also secured funding from the United States.<sup>119</sup> GlaxoSmithKline PLC is working with the National

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<sup>109</sup> *Id.*

<sup>110</sup> Sandee LaMotte, *Meet a Zika 'Vaccine Soldier'*, CNN (Sept. 22, 2016), <http://www.cnn.com/2016/09/22/health/zika-vaccine-trial-soldier/>.

<sup>111</sup> *NIH Begins Testing Investigation Zika Vaccine in Humans*, *supra* note 109.

<sup>112</sup> *Id.*

<sup>113</sup> *Id.*

<sup>114</sup> LaMotte, *supra* note 111.

<sup>115</sup> *Id.*

<sup>116</sup> Berkrot, *supra* note 8.

<sup>117</sup> LaMotte, *supra* note 111.

<sup>118</sup> Eric Sagonowsky, *Sanofi grabs \$43M in U.S. Government Funds to Advance Zika Vaccine into Phase II*, FiercePharma, (Sept. 26, 2016) <http://www.fiercepharma.com/vaccines/sanofi-grabs-43m-u-s-government-funds-for-zika-vaccine-r-d>.

<sup>119</sup> *Id.*



Institute of Allergy and Infection Diseases to create a new type of vaccine technology to help combat the Zika Virus.<sup>120</sup>

The European Union has also jumpstarted funding for a Zika Virus vaccine by granting five million euros (around \$5.3 million USD) to the ZIKAVAX consortium, which includes several major European pharmaceutical companies.<sup>121</sup> The consortium has also received a grant of £1 million (around \$1.27 million USD) from United Kingdom company Innovate UK to support vaccine trial efforts.<sup>122</sup>

In the Inovio vaccine trial there have been no significant safety concerns shown in forty volunteers after the first fourteen weeks since the initial dosage of the vaccine.<sup>123</sup> These figures were seen in human volunteers who had not been infected with the virus.<sup>124</sup>

While there have been many advances towards the creation of a vaccine for the Zika Virus, the World Health Organization has stated that the public should not expect a vaccine to appear on the market before mid-2018.<sup>125</sup> Many universities have also worked on creating a vaccine including the University of Pittsburg, University of Georgia, Harvard's Beth Israel Hospital, and the Walter Reed Army Institute of Research.<sup>126</sup> The University of Georgia also discovered through research that a large portion of Americans would not want a shot for the Zika

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<sup>120</sup> Bill Berkrot, *Zika Vaccine Race Spurred by Crisis and Profit Potential*, REUTERS (Oct. 4, 2016), <http://www.reuters.com/article/uk-health-zika-vaccines-analysis-idUKKCN12409R>.

<sup>121</sup> *EU Researchers Join Forces in Search for Zika Vaccine*, THEPHARMALETTER (Dec. 14, 2016), <http://www.thepharmaletter.com/article/eu-researchers-join-forces-in-search-for-zika-vaccine>.

<sup>122</sup> *Id.*

<sup>123</sup> Reuters, *Inovio's Zika Vaccine Evokes Robust Response in Human Study*, FOX NEWS HEALTH (Dec. 21, 2016), <http://www.foxnews.com/health/2016/12/21/inovios-zika-vaccine-evokes-robust-response-in-human-study.html>.

<sup>124</sup> *Id.*

<sup>125</sup> LaMotte, *supra* note 111.

<sup>126</sup> Ben Schmitt, *Pitt Research Offers Hope Against Zika*, TRIB LIVE (Oct. 3, 2016), <http://triblive.com/news/allegheeny/11249439-74/zika-vaccine-virus>; *see also* Sara Freeland, *UGA Researchers Working on Zika Vaccine, Can Comment on Virus* UGA TODAY (Apr. 14, 2016), <http://news.uga.edu/releases/article/zika-experts-0416/>; and Bonnie Prescott, *From A to Zika*, HARVARD MEDICAL SCHOOL (June 28, 2016), <https://hms.harvard.edu/news/zika>.

Virus even if recommended to them.<sup>127</sup> A possible explanation for this reservation is that the Zika Virus vaccine would be so new.<sup>128</sup> Glen Nowak, the lead researcher for the study stated “the word ‘new’ in front of a vaccine doesn’t work as well as when you put new in front of laundry detergent...when you put new in front of vaccine, people think experimental or that there’s not enough experience it, and they take a wait and see approach.”<sup>129</sup> With the collaboration between PharmaJet and the National Institutes of Health, who collectively are working on a needle free device to apply the vaccine, this reservation may be overcome.<sup>130</sup>

At a study conducted at Florida State University, the link between the Zika Virus and microcephaly is starting to become less of a mystery.<sup>131</sup> Professor Hengli Tang from Florida State, along with Guo-li Ming and Jongjun Song from Johns Hopkins, and Peng Jin from Emory have been able to discover that the Zika Virus is able to specifically target developing brain cells.<sup>132</sup> This research could help determine the link between the Zika Virus and microcephaly, though the research does not yet identify how the virus is transmitted to the brain.<sup>133</sup> This discovery is just the beginning of a longer study to determine the long-term effect on brain development due to the Zika Virus.<sup>134</sup>

### C. Congress

The fight against the Zika Virus held a prominent role in American politics in 2016. The Zika Response and Safety Act of 2016 was

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<sup>127</sup> Leigh Beeson, *Public Skepticism Would Likely Greet a New Zika Vaccine, Study Says*, UGA TODAY (Dec. 13, 2016), <http://news.uga.edu/releases/article/public-skepticism-would-likely-greet-zika-vaccine/>.

<sup>128</sup> *Id.*

<sup>129</sup> *Id.*

<sup>130</sup> Melissa Fassbender, *Needle-free Zika Vaccine Shows Promise in Clinical Trial* (Dec. 7, 2016), <http://www.outsourcing-pharma.com/Clinical-Development/Zika-vaccine-shows-promise-in-clinical-trial>.

<sup>131</sup> Byron Dobson, *FSU, Johns Hopkins Researchers Make Major Discovery about Zika Virus*, TALLAHASSEE DEMOCRAT (Mar. 4, 2016), <http://www.tallahassee.com/story/news/2016/03/04/fsu-johns-hopkins-researchers-make-major-discovery-zika-virus/81278936/>.

<sup>132</sup> *Id.*

<sup>133</sup> *Id.*

<sup>134</sup> *Id.*

introduced in the United States House of Representatives on February 3, 2016, and was sponsored by Representative Chris Stewart.<sup>135</sup> The bill was authorized to make funds available from prior appropriation acts to any federal agency for Ebola response, and to apply those funds to Zika Virus response and preparedness.<sup>136</sup> An identical Senate bill number 2518 was introduced in the United States Senate on February 9, 2016, but nothing further was done with the Bill.<sup>137</sup>

On September 29, 2016 a stopgap spending bill was signed to give \$1.1 billion to help fund the fight against the Zika Virus.<sup>138</sup> This funding only occurred due to a short-term funding bill that would keep the government operating until December 9, 2016.<sup>139</sup> A large portion of this funding will go to Florida, New York and Puerto Rico.<sup>140</sup> The National Institutes for Health will also receive more than \$160 million so as to continue the recently launched first clinical trial for a vaccine for the Zika Virus.<sup>141</sup> The funding will also be used to continue the work on creating a vaccine as well as fund studies that look at the effects the Zika Virus has on unborn babies, adults and children.<sup>142</sup> This funding came just in time as both the National Institutes of Health as well as the Centers for Disease Control and Prevention had run out of previous funding.<sup>143</sup>

This funding came from pulling money out of other programs, with \$500 million of the money coming from the Ebola outbreak fund.<sup>144</sup> The money from the Ebola fund was intended to help prevent another Ebola outbreak similar to the one the United States had seen a few years

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<sup>135</sup> H.R. 4446, *supra* note 17.

<sup>136</sup> *Id.*

<sup>137</sup> Zika Response and Safety Act of 2016, S. 2518, 114th Cong. (2016).

<sup>138</sup> Fox, *supra* note 4.

<sup>139</sup> Miami Herald Editorial Board, *Zika Fund a Day Late, Millions Short*, MIAMI HERALD (Oct. 1, 2016), <http://www.miamiherald.com/opinion/editorials/article105474201.html>.

<sup>140</sup> James Rosen, *How \$1.1 Billion Will Be Spent on Zika*, MIAMI HERALD (Sept. 29, 2016), <http://www.miamiherald.com/news/health-care/article104871266.html>.

<sup>141</sup> *Id.*

<sup>142</sup> Fox, *supra* note 4.

<sup>143</sup> *Id.*

<sup>144</sup> Dylan Scott, *Millions in Ebola Funding, a Casualty of Zika Virus, May Not be Replenished*, STAT (Jun. 1, 2016), <https://www.statnews.com/2016/06/01/ebola-zika-virus-funding/>.

prior.<sup>145</sup> The legislation also has directed \$394 million to mosquito control and \$397 million for work on vaccines and better tests to diagnose infections.<sup>146</sup> Another \$66 million will be used to help people infected with the Zika Virus in the United States territories.<sup>147</sup> Overall, \$953 million of the total funds will boost domestic efforts to curb the spread of the Zika Virus in the States, while \$175 million will target Zika Virus prevention efforts abroad.<sup>148</sup>

As the 2017 mosquito season is about to begin, United States Representative Darren Soto, from Florida, has presented the Strengthening Mosquito Abatement for Safety and Health Act, which would allow the Center for Disease Control and Protection the funding for mosquito-prevention programs through the year 2023.<sup>149</sup> The bill is backed by twelve co-sponsors from Florida, and has been sent to the U.S. Energy and Commerce Committee, and as of now no similar bill has been presented in the United States Senate.<sup>150</sup>

#### *D. World Health Organization*

The World Health Organization received \$23.9 million in funding via donations that will be used between July 2016 and December 2017 to help with Zika Virus preparedness.<sup>151</sup> The money will be used to help prevent and manage the medical complications caused by the virus, as well as expand health systems capacities, sexual and reproductive health, risk communication targeting pregnant women, and integrated vector management.<sup>152</sup> Another \$3.8 million has been allocated to the Zika Virus response by the World Health Organization Contingency Fund for Emergencies.<sup>153</sup>

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<sup>145</sup> Fox, *supra* note 4.

<sup>146</sup> *Id.*

<sup>147</sup> *Id.*

<sup>148</sup> Editorial Board, *supra* note 139.

<sup>149</sup> Kevin Derby, *Darren Soto Wants CDC to Have More Authority Taking on Mosquitos*, SUNSHINE STATE NEWS (Mar. 6, 2017), <http://www.sunshinestatenews.com/story/darren-soto-wants-cdc-have-more-authority-taking-mosquitos>.

<sup>150</sup> *Id.*

<sup>151</sup> *Zika: Response Funding*, *supra* note 6.

<sup>152</sup> *Id.*

<sup>153</sup> *Id.*

The World Health Organization lists five reasons why people should donate to help in the fight against the Zika Virus: 1) the World Health Organization is the only agency with universal legitimacy in matters of international health, which will help in the ability to lead and coordinate the response to the Zika Virus; 2) the organization helps countries develop and strengthen health and social services for individuals, families, and communities affected by the Zika Virus; 3) the World Health Organization is able to help fast-track the availability of effective diagnostic tests, vaccines, and public health guidance; 4) the organization will work with countries to try and prevent the adverse health outcomes of the Zika Virus through mosquito control, risk communication, and community engagement; and 5) the World Health Organization has the ability to communicate vital information to decision-makers, to help minimize the effects of the Zika Virus.<sup>154</sup>

A response plan has also been put into place by the World Health Organization, with the objectives of detection, prevention, care and support, and research.<sup>155</sup> The plan focuses mainly on expanding health systems capacities in affected countries, while also focusing on communicating risks with women of child-bearing age and pregnant women.<sup>156</sup> The response plan will offer health counseling and education to those women, while also providing for coordination and collaboration among the World Health Organization and its partners to make sure that preparedness and response capacities are supported to their fullest extent.<sup>157</sup> The World Health Organization has also developed technical guidance and training materials for countries to strengthen the countries capacity to prepare and respond to the Zika Virus.<sup>158</sup> On February 1, 2016, the organization declared all microcephaly cases due to the Zika Virus, along with other neurological disorders associated with the virus as a health emergency.<sup>159</sup>

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<sup>154</sup> *Id.*

<sup>155</sup> *Zika Virus Outbreak Global Response*, WORLD HEALTH ORGANIZATION, <http://www.who.int/emergencies/zika-virus/response/en/> (July 15, 2016).

<sup>156</sup> *Id.*

<sup>157</sup> *Id.*

<sup>158</sup> *Publications, Technical Guidance on Zika Virus*, WORLD HEALTH ORGANIZATION, <http://www.who.int/csr/resources/publications/zika/en/>.

<sup>159</sup> *Zika Virus and Complications, Situation Update*, World Health Organization, <http://www.who.int/emergencies/zika-virus/en/>.

In mid-November of 2016, the World Health Organization stated that the organizations global health emergency announcement regarding the Zika Virus ended.<sup>160</sup> The organization's committee members have still emphasized that while the emergency may be over, the crisis is still ongoing.<sup>161</sup> The announcement mostly has to do with the fact that the Zika Virus is a seasonal disease and may return as the months grow warmer next year.<sup>162</sup>

The World Health Organization has recently stated that it does not believe there will be a vaccine for the Zika Virus available for women of child-bearing age, before the year 2020, though there has been significant progress in the creation of a vaccine.<sup>163</sup>

### *E. States*

#### *i. Florida*

As the 2017 mosquito season begins, and on April 5, 2017 there have been 1,116 cases of the Zika Virus making up roughly twenty-one percent of the total Zika Virus cases in the United States.<sup>164</sup> This percentage makes Florida the largest state by percentage affected by the Zika Virus.<sup>165</sup> Of these cases, 216 of them were locally transmitted through presumed local mosquito-borne transmission, which is ninety-seven percent of the total local transmissions seen in the United States.<sup>166</sup> The local transmissions took place in three neighborhoods in the Miami area.<sup>167</sup> The first local transmission occurred in the Wynwood area, and the second occurred in a four and a half square mile stretch of

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<sup>160</sup> Donald G. McNeil Jr., *Zika is no Longer a Global Emergency, W.H.O. Says*, N.Y. TIMES (Nov. 18, 2016), <http://www.nytimes.com/2016/11/19/health/who-ends-zika-global-health-emergency.html>.

<sup>161</sup> *Id.*

<sup>162</sup> *Id.*

<sup>163</sup> WHO: *No Zika Vaccine Before 2020*, THE LOCAL (Feb. 2, 2017), <http://www.thelocal.ch/20170202/who-no-zika-vaccine-before-2020>.

<sup>164</sup> *Case Counts in the US*, *supra* note 20.

<sup>165</sup> *Id.*

<sup>166</sup> *Id.*

<sup>167</sup> Madison Park, *Another Miami Neighborhood has Active Zika Transmission*, CNN (Oct. 14, 2016), <http://www.cnn.com/2016/10/14/health/miami-florida-zika-transmission/>.

Miami Beach.<sup>168</sup> The third local transmission site was in the neighborhood of Little River, which had a one square mile radius with five non-travel related cases.<sup>169</sup>

Florida has spent \$62.1 million in state funds fighting the Zika Virus.<sup>170</sup> Initially, \$26.2 million from the state's General Revenue Fund, which was distributed in July of 2016 to be used for Zika Virus preparedness, prevention, and response in Florida.<sup>171</sup> The plan for this funding was for the money to be released as needed for preparedness objectives such as mosquito surveillance and abatement, training for mosquito control technicians, enhanced laboratory capacity, and purchasing of Centers for Disease Control Zika Prevention Kits.<sup>172</sup>

Another \$10 million for Zika Virus preparedness was allocated in early September of 2016 for preparedness and preparation.<sup>173</sup> An additional \$25 million in state funds was allocated on September 22, 2016, with the funds being authorized to support vaccine development research and to enhance Zika Virus testing methods.<sup>174</sup> The Florida Department of Health has been placed in charge of overseeing the grant process to distribute the research funding.<sup>175</sup>

An additional \$5 million in state funding was granted specifically to Miami-Dade County for preparedness and mosquito control.<sup>176</sup> Florida Governor Rick Scott stated:

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<sup>168</sup> *Id.*

<sup>169</sup> *Id.*

<sup>170</sup> *Gov. Scott Authorizes \$25 Million in State Funds for Zika Virus Vaccine Research and Development*, *supra* note 5.

<sup>171</sup> *Following Washington's Failure to Authorize Federal Zika Funding, Gov. Scott to Allocate \$26.2 Million for Zika Preparedness*, Rick Scott 45th Governor of Florida (Jun. 23, 2016), <http://www.flgov.com/2016/06/23/following-washingtons-failure-to-authorize-federal-zika-funding-gov-scott-to-allocate-26-2-million-for-zika-preparedness/>.

<sup>172</sup> *Id.*

<sup>173</sup> *Id.*

<sup>174</sup> *Id.*

<sup>175</sup> *Id.*

<sup>176</sup> *Gov. Scott: We will Provide \$5 Million in Additional Zika Preparedness Funding to Miami-Dade County*, Rick Scott 45th Governor of Florida (Aug. 22, 2016), <http://www.flgov.com/2016/08/22/gov-scott-we-will-provide-5-million-in-additional-zika-preparedness-funding-to-miami-dade-county/>.

We know from our recent success reducing the zone in Wynwood that our efforts to aggressively spray for mosquitos and educate the public are working. An aggressive mosquito eradication plan has already begun in Miami Beach and this \$5 million in funding will allow the county to help protect its families, visitors, and businesses.<sup>177</sup>

Governor Scott has also hosted roundtables to discuss ways to combat the Zika Virus, and has visited areas affected by the virus so as to better determine the best course of action for the state.<sup>178</sup> With the beginning of the 2017 fiscal year, starting July 1, Governor Scott is planning to spend \$2.9 billion on Zika Virus preparedness and prevention.<sup>179</sup> This fund includes spending \$1.9 million for epidemiology and disease surveillance, and another \$2.2 million to create a recurring fund to help prevent the Zika Virus in the upcoming years.<sup>180</sup> The planning for the 2017 mosquito season has begun as well, as Governor Scott, has asked the legislature to budget \$2.6 million in the 2017-18 budget, which would equal the budget spent to counter the Zika Virus last year.<sup>181</sup>

The Centers for Disease Control and Prevention granted the University of Florida, the University of Miami, Florida International University, and the University of South Florida \$10 million to study the Zika Virus and other diseases spread by the carrier mosquitoes.<sup>182</sup> This funding will mean that researches can test the most effective methods

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<sup>177</sup> *Id.*

<sup>178</sup> *Zika Preparedness Actions Taken by Governor Rick Scott*, Rick Scott 45th Governor of Florida (Aug. 17, 2016), <http://www.flgov.com/2016/08/17/zika-preparedness-actions-taken-by-governor-rick-scott/>.

<sup>179</sup> Daniel Chang, *Governor's Budget Proposes More Scientists, Research To Fight Zika Virus*, MIAMI HERALD (Jan. 31, 2017), <http://www.miamiherald.com/news/health-care/article129810939.html>.

<sup>180</sup> *Id.* Epidemiology is the study of the distribution and determinants of health-related events in specified populations, and focuses on communicable as well as non-communicable diseases. *Lesson 1: Introduction to Epidemiology*, Centers for Disease Control and Prevention (May 18, 2012), <https://www.cdc.gov/opphss/csels/dsepd/ss1978/lesson1/section1.html>.

<sup>181</sup> Auslen, *supra* note 63.

<sup>182</sup> Kyra Gurney, *Florida Universities, Backed by \$10 Million Federal Grant, at Center of Zika Research*, MIAMI HERALD (Dec. 22, 2016), <http://www.miamiherald.com/news/local/education/article122519844.html>.



for controlling mosquitoes.<sup>183</sup> Florida International University researcher Matthew DeGennaro stated, “I think the CDC [Centers for Disease Control and Prevention] is really making something unique happen here in Florida. The academic world is trying to respond to this crisis and I think that we can work together with mosquito control and all of these different groups.”<sup>184</sup> The universities are taking this research seriously, as Florida is seen as a gateway to the rest of the country for the Zika Virus.<sup>185</sup> The University of Miami also received another \$13 million grant from the Florida Department of Health to fund their Zika Virus related research, which is focusing on testing mothers infected, and the infants that may be born with related defects.<sup>186</sup>

Since the passage of the federal Zika Virus funding in the Stopgap Spending Bill, Florida has seen only a tiny fraction of the expected money flowing into the state.<sup>187</sup> With the legislation for \$1.1 billion signed by former President Obama, Florida has applied for approximately \$92 million in grants.<sup>188</sup> Overall, the federal government has provided the state with \$16.5 million in Zika Virus money.<sup>189</sup>

Governor Scott has outstanding requests to the Obama Administration such as, to help match the state’s investment in vaccine creation, develop a plan to control Zika Virus carrying mosquitos, create more Zika Virus prevention kits, and have the administration develop a plan for Florida to work with FEMA now that the Zika Virus is mosquito-borne in the state.<sup>190</sup>

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<sup>183</sup> *Id.*

<sup>184</sup> *Id.*

<sup>185</sup> *Id.*

<sup>186</sup> Carli Teproff, *UM Receives \$13 Million Grant From State to Fund Zika Research*, MIAMI HERALD (Feb. 1, 2017), <http://www.miamiherald.com/living/health-fitness/article130187664.html>.

<sup>187</sup> Amy Sherman, *Governor Says Federal Government Shortchanged Florida on Zika Money*, MIAMI HERALD (Dec. 15, 2016), <http://www.miamiherald.com/news/state/florida/article121089118.html>.

<sup>188</sup> *Id.*

<sup>189</sup> *Id.*

<sup>190</sup> *Gov. Scott: State clearing Little River Zika Zone; Florida Still Waiting on Important Federal Funding*, Rick Scott 45th Governor of Florida (Dec. 2, 2016), <http://www.flgov.com/2016/12/02/gov-scott-state-clearing-little-river-zika-zone-florida-still-waiting-on-important-federal-funding/>.

Florida lifted the last of its active transmission Zika Virus zones in early December of 2016 for Miami's South Beach.<sup>191</sup> The zones were lifted after forty-five days had passed with no reports of new locally transmitted infections.<sup>192</sup>

## ii. New York

New York is different from Florida in the fact that the *Aedes Aegypti* mosquito, the type of mosquito that carries the Zika Virus, does not lie in the state.<sup>193</sup> The state does have a close relative to this mosquito though and New York fears that this relative may begin to carry the virus.<sup>194</sup> In order to combat this threat, trucks spraying for mosquitos in New York City has more than tripled in recent months.<sup>195</sup> The city is currently using more than half of its \$21 million budget to combat the Zika Virus over the next three years.<sup>196</sup> While there have not been any locally transmitted cases in New York City, this is not stopping officials from continuing to spray for the insects.<sup>197</sup> The city has also created a website for its residents to be able to see when mosquito sprayings will be conducted and to view other surveillance information.<sup>198</sup>

As the 2017 mosquito season is set to begin, and as of April 5, 2017, the state of New York has not seen a local transmission of the Zika Virus.<sup>199</sup> There have been 1,016 travel related cases from the state, which amounts to around twenty percent of total Zika Virus cases in the United States, making the state the second largest state by percentage affected by the Zika Virus.<sup>200</sup> New York City alone has had five babies

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<sup>191</sup> Richard Luscombe, *Florida Lifts last of Miami's 'Zika Zones'*, GUARDIAN (Dec. 9, 2016), <https://www.theguardian.com/world/2016/dec/09/zika-zones-florida-miami-lifted>.

<sup>192</sup> *Id.*

<sup>193</sup> Charley Lanyon, *How New York City is Fighting the Growing Threat of Zika*, NEW YORK (Aug. 22, 2016), <http://nymag.com/daily/intelligencer/2016/08/how-new-york-city-fighting-zika.html>.

<sup>194</sup> *Id.*

<sup>195</sup> *Id.*

<sup>196</sup> *Id.*

<sup>197</sup> Santora, *supra* note 9.

<sup>198</sup> *Id.*

<sup>199</sup> *Case Counts in the US*, *supra* note 20.

<sup>200</sup> *Id.*

born with Zika Virus-related brain development issues.<sup>201</sup> Out of approximately 8,000 New Yorkers being tested for the virus, 962 tested positive, with 325 of those people being pregnant women.<sup>202</sup> There have also been eight other babies born in the city that have tested positive for the Zika Virus, but so far have not shown any developmental problems.<sup>203</sup>

### iii. Texas

In August of 2016, Texas allowed Medicaid funding to pay for mosquito repellent.<sup>204</sup> This decision came two months after the Obama Administration told states that this type of funding was permitted.<sup>205</sup> The funding of mosquito repellent was guaranteed to continue through October 31, 2016.<sup>206</sup> The Texas Department of State Health Services has created a website for residents to visit that includes a timeline of how the virus has impacted the state.<sup>207</sup> The website also includes reported cases of the Zika Virus by county and updates the count for locally transmitted cases.<sup>208</sup>

Local transmission of the Zika Virus began in November of 2016 in Texas.<sup>209</sup> The first person to be identified as having the virus locally was a woman from Brownsville.<sup>210</sup> The state and the Centers for Disease Control and Prevention are working together to determine the cause and

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<sup>201</sup> Marc Santora, *New York City Has 5 Babies Born with Zika-Related Brain Issue*, N.Y. TIMES (Dec. 7, 2016), <http://www.nytimes.com/2016/12/07/nyregion/new-york-city-zika.html>.

<sup>202</sup> *Id.*

<sup>203</sup> *Id.*

<sup>204</sup> Edgar Walters, *To Fight Zika, Texas Medicaid Will Pay for Mosquito Repellent*, TEXAS TRIBUNE (Aug. 3, 2016), <https://www.texastribune.org/2016/08/03/zika-texas-medicaid-pay-mosquito-repellent/>.

<sup>205</sup> *Id.*

<sup>206</sup> *Id.*

<sup>207</sup> *Zika in Texas*, Texas Department of State Health Services, <http://www.texaszika.org/index.htm> (Dec. 31, 2016).

<sup>208</sup> *Id.*

<sup>209</sup> Donald G. McNeil Jr. & Manny Fernandez, *Local Transmission of Zika Virus is Reported in Texas*, N.Y. TIMES (Nov. 28, 2016), <http://www.nytimes.com/2016/11/28/health/zika-case-texas.html>.

<sup>210</sup> *Id.*

prevent the spread of the virus, though no travel warning has been put in place yet.<sup>211</sup> The warmer weather in southern Texas also raises concerns for the spread of the virus, as mosquitoes thrive in warm weather.<sup>212</sup> With hope for cooler weather on the way, Dr. John Hellerstedt of the Texas Department of State Health Services believes that cool temperatures, along with increased mosquito control efforts, will decrease the probability of locally transmitted cases.<sup>213</sup>

As the 2017 mosquito season begins and as of April 5, 2017, the state of Texas has seen 320 travel-related cases of the Zika Virus, which amounts to only around six percent of total infections in the United States, which is the fourth largest state by percentage affected by the Zika Virus.<sup>214</sup> Texas did become the second state to have local transmissions with six reported cases, around three percent of total local transmissions.<sup>215</sup>

#### iv. California

California has received \$720,000 in funding from the Centers for Disease Control with the intent to help the state collect data about birth defects caused by the Zika Virus.<sup>216</sup> The funding is not to be designated for Zika Virus treatment in any way.<sup>217</sup> The California Department of Public Health has a website that discusses the Zika Virus and gives updated case counts and information in regards to the virus.<sup>218</sup> Two babies in the state have been born with microcephaly, and the mothers had been tested positive for the Zika Virus.<sup>219</sup>

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<sup>211</sup> *Id.*

<sup>212</sup> *Id.*

<sup>213</sup> Melanie Evans & Dan Frosch, *Four New Texas Zika Cases Likely Locally Transmitted, Officials Say*, WALL ST. J. (Dec. 9, 2016), <http://www.wsj.com/articles/florida-no-longer-an-active-zika-zone-officials-say-1481309000>.

<sup>214</sup> *Case Counts in the US*, *supra* note 20.

<sup>215</sup> *Id.*

<sup>216</sup> Mira Chaplin, *Centers for Disease Control Gives California Grant to Gather Information on Zika* (Aug. 10, 2016), <http://www.dailycal.org/2016/08/10/centers-disease-control-gives-california-grant-gather-information-zika/>.

<sup>217</sup> *Id.*

<sup>218</sup> *Zika*, California Department of Public Health, <http://www.cdph.ca.gov/HealthInfo/discond/Pages/Zika.aspx> (Dec. 31, 2016).

<sup>219</sup> *Id.*

The state also extended travel warnings to those returning home from the Olympics to wear insect repellent and to use protection before engaging in sexual relations.<sup>220</sup> The mosquito that carries the virus has been found in multiple southern Californian counties.<sup>221</sup> In San Diego, officials have found larvae of the mosquito known to carry the virus, and have scheduled to spray for the mosquito in that area.<sup>222</sup>

As the 2017 mosquito season is set to begin, and as of April 5, 2017, there have been 438 travel-associated cases of the Zika Virus in California, which is around nine percent of total cases in the United States, making the state the third largest state by percentage affected by the Zika Virus.<sup>223</sup>

## V. CONCLUSION

While both the state and federal government are working towards a solution for the Zika Virus, more should be done in regards to funding prevention, preparedness, and research. The Federal government passed a bill, which released funding for the Zika Virus, but the money was significantly less than asked for, and was passed only through a bill that was required to keep the government open and functioning for a few more months.

In order for there to be a substantial effect on the fight against the Zika Virus, more federal funding needs to be passed and should be made available to support children with Zika Virus-related birth defects and families affected by the virus. The politicians in our federal government need to look past their party lines and see that the Zika Virus is a serious matter that is going to affect the United States for many years to come. Babies born with microcephaly will have to grow up with severe developmental issues, and the areas where naled is being sprayed may have unexpected long-term side-effects. This, combined with the fact

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<sup>220</sup> Susan Abram, *Zika Cases Jump to 170 in California, Sparking Travel Warnings*, LOS ANGELES DAILY NEWS (Aug. 19, 2016), <http://www.dailynews.com/health/20160819/zika-cases-jump-to-170-in-california-sparking-travel-warnings>.

<sup>221</sup> *Id.*

<sup>222</sup> *Id.*

<sup>223</sup> *Case Counts in the US*, *supra* note 20.

that it could be years before a vaccine is created to prevent the spread of the virus requires immediate action.

The federal government should also create more funding for vaccine development, as to ensure a vaccine as quickly as possible and to help carry out the current clinical trials. Governmental agencies such as the Center for Disease Control and Prevention are working towards creating a vaccine; for the most part the creation has been put on the big pharmaceutical companies. While the Priority Review Voucher Program encourages these companies to create the vaccine for altruistic reasons, the companies most likely will spend the attention necessary to create such a crucial vaccine.

State governments should also do more to fund the protection of their citizens from the Zika Virus. Florida is the only state that has actively funded any programs related to the Zika Virus. With New York, Texas, and California facing infections larger than the national average, these states should be doing more to prevent the spread of the Zika Virus. Florida has funded the fight against the Zika Virus the most, which is due to the fact that the state was the first state where local transmission of the Zika Virus occurred, along with the state's economy being dependent on tourism. Other states should learn from Florida's example and begin to apply the programs used to their own citizens before it is too late to fix the problem. Just because Florida wanted tourists to believe visiting the state was safe, and to not cancel their vacations, does not mean that other states should not follow the example that Florida is setting. The Zika Virus is a virus that requires a proactive approach, not a reactive one.

In order for a proactive approach by state governments to be effective, members of the state legislatures must ban together to create a bi-partisan funding bill that will help to distribute funding to Zika Virus preparedness and response. This should include vaccine research, easy and affordable Zika Virus testing, and mosquito breeding ground prevention. State legislatures should also call on their national counterparts to aid in funding, and have a bi-partisan bill come out of Washington, D.C. as well to add to Zika Virus preparedness.

While the World Health Organization is doing a lot to help those affected by the Zika Virus, they could also be doing more. The organization does not directly fund countries that are affected by the virus, but rather the organization delivers funds that have been donated. The World Health Organization also organizes collaborative efforts to

make sure that countries that are affected by the Zika Virus have the chance to keep their people as healthy as possible, while limiting the spread of the virus. For the World Health Organization to make a substantial impact in Countries affected by the Zika Virus, the organization should also partner with national and state governments to help the countries create their own monetary fund to help fight the disease. While removing the emergency level on the Zika Virus makes sense as the warmer months come to a close, the announcement makes the organization seem weak in the fight against the Zika Virus. As the World Health Organization continues to call the Zika Virus a crisis, shifting the focus off of the virus will potentially begin the trend of apathy, and eventually the level of research to end the virus will start to decline.